

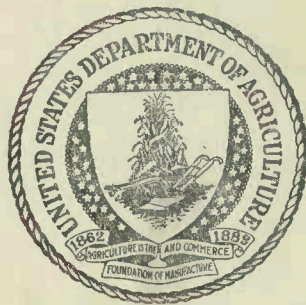
## **Historic, archived document**

Do not assume content reflects current scientific knowledge, policies, or practices.

RESERVE

A41  
M27

UNITED STATES  
DEPARTMENT OF AGRICULTURE  
LIBRARY



RESERVE  
BOOK NUMBER  
**986245**

**A41**  
**M27**



Huron.S.D.  
Box 1114.  
June 16.1931.

Dr.Wilson.Inspector in charge.  
Federal Building.  
Pierre.S.D.

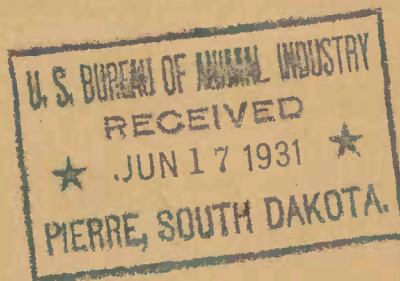
Dear Doctor:

Am forwarding to-day a literal translation of part of an article I reviewed in Nr.2.Jan.11.1931.Tierärztliche Rundschau.which I believe is of very much interest in regard to the work on swine - erysipelas.Hope that you can use same.

Respectfully Yours

*H.J. Magens.*  
H.J.Magens.  
Jr.Vet.U.S.D.A.

*1.incl.*







Extract from: Relationship of Tonsils of the swine to microorganisms by  
Dr. Hubert Horn, Assistant Hygienic Inst. Vet. College Berlin.  
Tierärztliche Rundschau, Nr. 2. Jan. 11. 1931.

### Swine Erysipelas.

Page 22. " The tonsils of pigs suffering from swine-erysipelas appear either absolutely normal or are characterized by a diffuse, spotted or ramified reddening. The plane of section of these ramifications showed hemorrhages. These were either isolated ~~and~~ localised in punctiform spots or they were arranged in stripes at several locations from the epithelium to the connective tissue strata. The ducts were enlarged to several times their natural circumference and contained massed secretions which could be squeezed out easily and seemed to be of a dirty gray to yellow in colour. Microscopically as well as histologically bacteria *rh. suis* Kitt could be observed in large masses in these secretory plugs. Otherwise the histological picture offered very little characteristic changes. Within the lymphatic tissue the *bac. rh. suis* Kitt were massed in the follicles, although not all follicles were equally and evenly invaded. Erythrocytes were seen under the papillary bodies and in the vicinity of the duct-endings in more or less large masses. Also within the follicles such hemorrhages had taken place. Partly desquamation of the epithelial coverings of the ducts thus exposing the true lymphatic tissue of the follicles has been observed. Emphasis must be laid on the fact that microscopical and histological prove of the presence of these bacteria was not possible in all specimen. Culturally the proof of the presence of these bacteria offered was rendered very difficult from these plugs even though the material was very fresh, microscopical findings were relatively easier. Animal-Experiments were instituted in all cases.

### Hog-Cholera.

Two cases of Hog-Cholera were observed. Hæraemia, serous infiltration and hemorrhages were macroscopical findings. The plane of section revealed spotted ~~or~~ evenly distributed reddened areas from a bright red to a dark, deep red. Increased infiltration of blood was seen on the edges, which was shown also in the histological picture. Extravasations of blood was in appearance mostly on the periphery. Punctiform hemorrhages up to the size of a lentil and diffuse bloody infiltrations had taken place within the parenchyma proper. Histological findings proved these macroscopical changes. All blood-vessels were very much filled with erythrocytes, not only in the vessels themselves but also in the surrounding tissues they were represented very strong numerically. Bacterial findings could not be made either histologically, microscopically nor ~~cul~~turally. Hæraemia, hemorrhages in presence of bacterial invaders therefore was the result of these findings.



Swine Erysipelas; a review and observations thereon

by 986245

H. J. Magens, Jr. Vet. U. S. D. Agr. Bureau of Animal Industry (M. I.).

Swine Erysipelas (Rotlauf in German, Rouget du porc in French, male rosso or antrace crespelato in Italian) is one of the febrile, infectious diseases of swine, which is caused by a rod shaped, nonmotile organism, the *Bac. rhusiopathiae suis* Kitt. It is unflagellated, gram positive, aerobic and anerobic and is pathogenic for other <sup>animals</sup> (mice, rabbits and pigeons etc.) and man as well. Characteristic for the disease are an extended exanthema, hemorrhagic inflammation of the stomach and parts of the intestines, an inflammation of the kidneys, splenic tumors, parenchymatous degeneration of the liver, of the heart and skeletal muscle.

Distribution : The disease is prevalent in most European countries with the exception of England, Norway and Sweden, where only sporadic outbreaks have been observed. This is due to the enormous ubiquitous distribution of the *Bac. rh. suis*, which seems to do especially well in stagnating water, preferring certain localities, pastures of certain types and valleys of certain descriptions, similar to the Anthrax organisms, which also have a marked preference for sections offering ideal conditions. Marshes, flooded pastures and land etc. heavy loam, clay and chalky soils, if of alkaline reaction, when continually inundated, moist and wet are ideally suited for the propagation of the disease. Sandy soils and those containing granite etc. are not a well adapted habitat for this infectious disease, unless they happen to be also exposed to rain or overflow water. Most outbreaks will occur during the summer time



or during the especially hot days in the spring and the fall. High temperatures seem very favorable to the development of the organisms. Moist, poorly drained hog-lots and poorly kept, dirty, ~~mosi~~ and soiled feeds seem to have a decided influence upon the run of the infection. All authors seem to agree, that the very young animals up to about three months are immune. This tallies with the fact, that we never vaccinated any suckling pigs against the disease. Yet one must bear in mind the experience we have made frequently, namely that pigs will lose their immunity shortly before or after weaning and that therefor this date is somewhat flexible. There exists a marked tendency of some of the more highly bred strains to develop the disease (Poland-Chinas, Chester Whites, Hampshires etc.). The question remains open though if this is not more to be explained by the different method employed in rearing and raising these animals. They are generally kept much more under confinement, in closer quarters and are more or less force-fed (high protein feeds etc.) (Intensive method). The mixed breeds in contrast to this are raised in many instances more under ranching conditions (Southwest), in large pastures (oak and acorn mast, plenty running water, sandy or granitic subsoils etc.) (Extensive method). Infectious material is given off through the feces, the urine and the vomitus. Natural infection therefore occurs in many instances due to animals eating infected feed and drinking infected water. Carcasses of animals having succumbed to the disease offer another avenue of infection. Important is also that the Bac. rh. suis Kitt has been isolated from the vaginal discharges of cows suffering from metritis. It also has been demonstrated in field and house-mice of various species. Of eminent importance is also the fact that bacteria have been isolated from the tonsils and the mucous plugs of the



ilco-caecal valves of absolutely healthy animals, since they are evidently carriers and become of importance if other predisposing causes such as bodily overexertion, ~~hypothermy~~<sup>hyperthermy</sup>, especially during transports, sudden changes of feed and other routine, common colds and other diseases tender to lower the animal's vitality and resistance cause the newly infected animals to become highly sensitive and the bacilli upon entering a new host under ideal conditions highly pathogenic. The facts enlarged upon will explain the many, seemingly spontaneous outbreaks, caused by these normally ~~appearing~~ carriers. One must of course mention as one of the debilitating causes the lowered vitality of animals caused by the presence of internal and other parasites in large numbers, as well as the debilitating sequelae attending parturition etc. of sows. In this connection it also must be stated that if young animals have not been exposed in their early months of life, they are very apt to be severely affected later on in life. <sup>2</sup> Although the most dangerous time is the time between the ages of 3 months to 12 months. Hyperthermy, which is apt again to be more prevalent during the summer months explains in a way the time most often outbreaks have been observed. Personally we have noted, that pregnant sows, maybe on account of being less resistant due to impaired metabolism are very often susceptible to the disease. They abort in some instances and <sup>2</sup> in many cases observed the pigs will ~~be~~<sup>be</sup> stillborn or will succumb shortly after being born. Primiparae seem to be more often affected than others. Conditions of housing, feeding etc. etc. play a very important part here too.

Etiology : Bacteriological experiments of Löffler in 1882 have shown that swine-erysipelas is caused by a fine rod, which is very similar to the organism causing Koch's Septicaemia of mice. It will kill either grey or white mice positively and will either cause rabbits to die or to exhibit the ty-



o/  
 pical exanthematous processes and become immune after these have been repaired and healed. In the same year Pasteur & Thuillier worked with the disease and produced a vaccine against it. Schottelius, Löffler and Schütt continued their labors establishing many important data about the disease. Cornevin and Jensen also made valuable contributions, but it was Lorenz, who made the first highly effective Immune Serum, which is used even to-day. According to Schütz, Löffler and Schottelius the Bac. rh. suis Kitt is a fine straight rod, averaging in length from 1-1½  $\mu$ . In cultures or if obtained from the gall secretion of animals suffering from the disease chronically they will grow in long chains. They may be found within the leucocytes or in between the reds, but they are easiest seen in the spleen, the kidneys and the liver. They stain readily with the common anilin-dyes or Gramstain. Stab-cultures in gelatine are very easily obtained and will take the appearance of a small brush. It is a very difficult matter to destroy the bacillus (Meat Inspection). The effects upon mice and pigeons are described elsewhere. Guineapigs, geese and ducks are not affected. Serumhorses will often show a chronic endocarditis, severe forms of Arthritis, amyloid degeneration of the liver and thrombosis in various arteries. This phase of the disease of course needs elaboration and more detailed study due to the many febrile, infectious diseases commonly ~~appearing~~ appearing in hogs in this country. Guidelines, differential findings prepared in chart form for easy reference in the field should be worked out. Laboratory methods also in standard form should be established so they may be used comparatively and correct interpretation of findings is assured. We cannot dwell upon this specialized phase of the work at length, but we refer you to the standard texts on that matter.



Pathogenesis : It has been shown that bacteria enter the intestinal tract through ingestion and that in many instances they are found there in healthy animals. Their march into the inner recesses of the intestinal mucosa is made possible through the intestinal parasites (Strongylidae, echinorhynchus gigas). Several days elapse until they are traceable in the blood, where they are seen within the leucocytes. There they multiply enormously causing serous transsudation, a lessening of the surface-tension of the vessels (Rubor of epidermis) and obstruction of the capillaries (Thrombosis later necrosis). Toxins, they form, are directly responsible for the intensity of the disease, because in some cases with a rapid lethal end only bacteria in minute quantities were found except at the site of infection, where they were very numerous. A septicaemia ensues once the bloodstream has been entered. Generally speaking two ways are selected. In animals possessing an unpigmented skin, the causative agents settle in the skin, where their toxins will set up the changes mentioned above or they are found in the internal organs such as the spleen, the liver, lymphnodes and nodes and vessels. In both cases recoveries are possible. Yet in both cases or types some of the organisms may be lodged upon the valves of the heart or in the various joints. Often after the acute symptoms have subsided a chronic endocarditis, mostly fatal, or an arthritis will be the final outcome. Similar to Anthrax again, an enormous increase in the number of the bacteria has been observed.

Symptoms : After the incubation-period, <sup>shortly after death</sup> which seems to be only of less than 3-5 days duration when the animals involved have ingested with infected carcasses or water or otherwise assimilated as for instance through a wound-infection etc. enormous quantities of the pathogenic organisms, the disease generally begins under very severe symptoms mostly without any warning.



The animals lose their appetite. They vomit in many instances. They have very high temperatures and act nervous and frightened. They appear listless and tired out hiding in their bedding. They acquire a "wobbly" gait and suffer always in the beginning from constipation. They do not root anymore. The conjunctivae become injected and often discolored from a dark, deep red to a red brown. In many instances the lids are very much swollen. Some animals die already after these symptoms have been observed without exhibiting any of the typical discolorations of the skin. It is this form therefore which the French call "le rouget du porc blanc" (Cagny). This represents in our estimation the most virulent form of the disease and should be called the peracute type. Fortunately it does not appear very frequently. Mostly in new outbreaks at the very beginning and in new locations analogous to other febrile infectious diseases. Generally speaking though three more or less well marked types of the disease are observed. They are the acute forms namely the urticaria type of swine erysipelas secondly the septicaemic type of the disease and the chronic type with several different manifestations. In the first acute form generally after the symptoms as described above have been observed (although they may be so little severe as to be hardly noticed) hyperaemic exanthemata of a light red or pink color appear in the region of the thighs, on the abdomen and on the back. We have observed them mostly in the very beginning of the trouble on the posterior aspects of the lobes of the ear (concha auris). Soon they will take on certain shapes, rhomboids or diamonds mostly although circular spots have been noticed, the <sup>edges</sup> ~~centers~~ remaining deeply stained and the centers remaining lighter in color. Confluence of larger areas is seen often. In lighter cases resolution and desquamation begins several days after.



In some cases with more tendency of becoming chronic necrosis occurs. A hard leatherlike crust will form which gradually just seems to roll up. At times seriously infiltrated pustules have been observed on the skin leaving later on upon absorption or desiccation also a dry, scaly, leatherlike scab, which will fall off eventually. This form has the lowest percentage of mortality. The second acute form of swine erysipelas begins almost identically as the first acute form, only much more severe than the former and due to its intensity better marked. The constipation described in the former, the first acute form type, changes into a very severe diarrhea. At first it will appear soft and semi-solid, but it will become later on watery, thin, grey in color and when becoming brownish it has been mixed with blood from intestinal hemorrhages. The discolorations on the skin are <sup>different otherwise the same</sup> only in extent and intensity/as described for the first form. There will appear a gradually increasing cyanosis of the mucous membranes. Oedema of the lungs and dyspnoea become more and more prevalent and the temperature subnormal, a sure indication of a sudden demise. In these cases the necrotic areas on the skin, the ears and the tip of the tail are much more often observed than in the former acute form <sup>due</sup> undoubtedly to the more virulent toxicity of the organisms invading the host. The dyspnoea becomes more and more evident towards the end. Should the animals live through the fourth day of the attack, they might recover; although some few may still succumb from the sixth to the tenth day (Manninger). In this form a higher percentage of losses prevails. With regard to the third form of the disease or the chronic type one has observed that the animals have apparently completely recovered from an attack of mostly the first form several weeks or months before. The first one of the gradually increasing severity <sup>Symptoms low</sup> ~~of the~~



is the fact, that the animals appear unthrifty in comparison with their litter-mates. The appetite becomes more and more diminished. The hogs cough continually, they rest always lying on their chest supported by their elbows without moving if possible. Dyspnoea is very evident. The mucous membranes become cyanotic, whenever the animals have been exerted the least bit. A livid, light red again discolours the parts of the body mentioned above. The pulse rate becomes very much increased, heart murmurs are easily heard (Endocarditis, mitral stenosis). The animals will finally succumb, cachecia becoming more and more pronounced. Other chronic conditions in other cases under different circumstances have been observed, but the chronic condition described above with the clinical picture of an endocarditis and mitral stenosis is the most persistent. Besides the endocarditis mentioned above one more condition deserves mention. It is a chronic arthritis, sero-fibrinous and deforming in character, mostly seen in the <sup>2</sup>hips, the knee, the carpal and tarsal joints. The chronic conditions described first present a typical picture readily diagnosed and recognized. They are in most all instances fatal. The chronic arthritis might be regarded more or less as a sequela, which due to its appearance similar to other conditions of that sort cannot be readily diagnosed differentially. Only laboratory findings on post mortem examination will establish the fact of Bac. rh. suis Kitt being involved. This condition is observed in the wake of many febrile, infectious diseases. In this connection we want to mention the sequelae accounted for in humans after a heavy siege of diph<sup>h</sup>theria. It is this fact undoubtedly, which makes Fröhner and Zwick's statement so very plausible that the organisms most deadly influence is through their toxins and endotoxins.



Pathological anatomy: As in <sup>other</sup> septicæmiae the post mortem picture will show in the common second acute form, the septicæmic type, which is the most often observed, a hemorrhagic gastro-enteritis, marked swelling of all lymphatic organisms, hemorrhagic and parenchymatous nephritis, an acute tumor of the spleen as well as parenchymatous hepatitis and myositis. (Fröhner & Zwick). The pyloric region of the stomach is often inflamed, very hemorrhagic, petechia covering the whole region the surface being covered by a thick, heavy, gelatinous secretion. Mucous membranes of the duodenum, ileum and region around the ileo-caecal valves are similarly changed. (Compare location of bacterial infarcts). Peyer's patches are injected, sometimes hemorrhagic. The spleen is in all acute cases not so very much enlarged, yet the engorgement may be readily seen. The pulpa often is crushed beneath the capsule just when being palpated. The plane of section will bulge out and the pulpa appears very much softened and of a dark reddish brown and if so desired may be readily stripped. (Manninger). The liver is also of a reddish brown color and if exposed to air it will turn into a bright red. In the cortical layers of the kidney, which is at times hyperæmic and at times parenchymatously degenerated one will find petechia. In many cases the heart and skeletal muscles appear grey in color. Small hemorrhages are nearly always found on the valves of the heart and on the epicardium. The lungs are oedematous, hyperæmic and in many cases a sero-fibrinous inflammation may be seen. In all cases one will find within the peritoneal cavity besides a limited amount of a cloudy fluid, very fine fibrin-threads, often they are arranged in netform often appearing in flakes and again in lumps. The same exsudate may be found within the pericardium and in many cases the epicardium will be covered completely by this fibrinous exsudate. The bladder is always



covered with petechial hemorrhages in this type. In sows mostly we have observed a bloody urine.

In chronic cases the post mortem picture will show an endocarditis and in many instances the bicuspid and semilunar valves will show enormous cauliflowerlike protuberances, fibrinous structurally. After removal of these neoformations wartlike protuberances resembling ulcers are often found on the valves themselves. (Hutyra & Marek). All conditions which are directly due to this valvular stenosis and endocarditis such as Hydrothorax, Hyperæmia of the lungs, liver and spleen also infarcts in liver and kidneys. In those cases where an arthritis has developed one will find fibrin flakes and exsudate within the joint-capsules. In some instances the cartilages will be ulcerated similarly to the endocardium. *Bac. rh. suis* Kitt may be isolated from the joint-fluid and the secretion from the gall although morphologically changed (Pitt, Svenneby).

Diagnosis: The most persistent symptom in the acute types of swine erysipelas is the well-marked and typically formed exanthema. To be true several other febrile, infectious diseases exhibit as well exanthemata yet they are not of that particular type and confirmation and the whole run of the disease is different. Observation of many cases and the frequent rendering of differential diagnostic decisions in many cases will make one finally an adept at it. Besides there are the post mortem <sup>2</sup>changes which are very typical to rely upon and the bacterial proof of the disease which is not at all difficult to obtain. A cover glass preparation may be made directly from the purple spots by carefully incising them and making a smear from the fluid issuing. A very ready and reliable means of verification of diagnosis is by animal injection. Grey or white mice or pigeons are



best adapted for this work. Small segments of spleen or a little blood are to be injected under the skin of their backs or breasts. The mice will react within 24 hrs. They become listless, their coats stay and rough. They arch their backs, their breathing is very much increased and a viscid, jellylike secretion issues from the conjunctiva. Death will come in from 2-4 days. Pigeons will die generally in from 3-4 days after vaccination. Anamnesis (Preferred localities) plays also an important part in the diagnosis. Laboratory specimen should be taken from the spleen and the kidneys principally and one of the small long bones (carpal or tarsal) may be selected. (Manninger). All specimen should be well borated to guard against putrefaction on account of other similar bacteria entering them. It must be borne in mind that with regard to certain localities certain types will be more prevalent, which is very similar to practical experience with anthrax. Most difficult will be in some cases the differential diagnosis of Hog-Cholera. Yet write Hutyra & Marek there will be found on one or more carcasses either the changes typical for Hog-Cholera in the lungs or parts of the intestines. Characteristic changes in swine -erysipelas are generally limited to catarrhal inflammations of the mucous membranes of the stomach and sections of the small intestines. Hemorrhages are petechial and punctiform mostly and are mostly found in the cortical layers of the kidneys. The spleen will be enlarged moderately, it's pulpy matter softened and it's color changed exhibiting variations from a dark red to a deep reddish brown. Anthrax of swine is not very frequent and when found typical lesions may be readily seen upon post mortem, besides it must be thought of that this disease is not at all characterized in hogs by the rapid peracute course it takes in other species (Cattle, sheep and goats). In swine it is



a slowly progressing disease of typical symptoms and of a decidedly lower rate of mortality than swine-erysipelas. True urticaria Fröhner & Zwick state, is not contagious. It appears sporadically and it is not accompanied by any appreciable rise in temperature. We were always able to differentiate easily between the two conditions by the difference of localisation and appearance of the exanthema. Tarumatic changes of udders of lactating and nursing sows are mostly unilateral and are painful to touch. They appear sporadically only too. As we stated before experience with the disease and an intimate understanding of its peculiarities and types will soon dispel all doubts as to diagnostic decisions. Laboratory findings will verify and substantiate any doubtful diagnosis which was based on the findings mentioned in the foregoing paragraphs. With regard to the chronic forms we wish to say that the findings on the endocardium and the mitral and semilunar valves are very typical. With regard to arthritis cases the differential diagnosis is only possible by laboratory confirmation of the Bac. rh. suis Kitt in the synovial fluid and by demonstrating them in the gall secretion (Pitt, Svenneby). Of course the fact of an ever increasing number of febrile infectious conditions affecting hogs will render differential diagnosis with regard to swine-erysipelas difficult enough and since conditions vary very much in different sections guidelines will have to be worked out for many different sections considering different secondary invaders. We are confident that this will be done and accomplished if a serious effort is made in this dierction.

Treatment: Experience in treating large numbers of hogs over a rather large area and in different countries and therefore under widely varying conditions make us fully agree with authors like Manninger, Hutyra & Marek



Fröhner & Zwick that symptomatic treatment is in most cases futile. It has some usefulness if it has a general effect upon the animal under treatment (stimulation: alcohol, camphor wine, etc.) (febrifuges, intestinal antiseptics) yet we found calomel in rather heroic doses of decided benefit in early cases. Especially broodsows <sup>2</sup>in pregnancy and at the time of parturition, which we observed seemed to be under certain conditions rather susceptible to the disease responded surprisingly well to treatment. Heavy doses of immune serum (30-60 mls) especially were repeated once or twice within several hours of initial treatment and given intravenously into one of the veins of the lobe of the ear. Treatments with immune serum obtained by hyperimmunizing horses of other well advanced cases were also very gratifying. Care must be taken that anaphylaxis is avoided by fractional injection of serum. In this country we believe best prophylactic results will be obtained by the simultaneous method after Lorenz or Leclainché resulting in an active immunity. Analogous with treating Hog-Cholera, virus treatment in affected herds is to be avoided. The dosages of virus and serum are in a definite ratio as indicated by the laboratories producing them and their instructions should be followed. It is advisable to repeat virus alone after 10-14 days after simultaneous treatment has been administered. Only animals appearing perfectly healthy and normal should be treated prophylactically; pregnant, lactating and nursing sows may be treated by serum without any ill-effects, abortion has only been observed in a few isolated instances under very unfavorable conditions. Weaning of pigs will establish the proper time for their vaccination namely shortly after they are over its ill-effects. Immunization of suckling pigs is useless. Experience in later years has taught the va-



lue of application of foreignbodyproteins and ceratin biochemical agents. This latter field especially offers definite encouragement judging by the late contemporary literature. Its usefulness is indicated in all cases where a clearcut diagnosis is impossible due to secondary invaders and mixed infections. Again it is useful in those cases where the sequelae are severe or where the animals become chronically ill.

Conclusion : The gratify<sup>g/</sup>in results obtained with immune-serum alone & simultaneous treatment either curatively or prophylactically in this contagious febrile disease suggest a safe method to entirely overcome its ravages, which in years to come will become more and more of an economical factor. Much work remains to be done with regard to the development of dependable simple methods of differential diagnosis with the aid of laboratory animals for instance under field-conditions considering one and all of the many febrile infectious conditions continually encountered in hog practice. Another side of the matter is the introduction of biochemical therapeutical agents of proven value in keeping with the work of modern investigators. We base our hope in many instances upon the latter course since so far results were very satisfactory.







